REMARKS

The Office Action has rejected Claims 89-93 and 95-106 under the judicially created doctrine of obviousness double patenting for allegedly being unpatentable over Claims 45-77, and 79-180 of copending patent Application No. 07/580,246. In addition, it has rejected Claims 89 and 93 under 35 U.S.C. 112, first paragraph for allegedly containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the art that the inventors at the time the application was filed had possession of the claimed invention. Moreover, it has rejected Claims 89-92 and 95-106 under U.S.C.§102(b) or, in the alternative under 35 U.S.C. §103(a) as defining subject matter which is allegedly anticipated by, or in the alternative rendered obvious by, the teachings in an article by Kroto, et al. in Nature 1985, 318, 162-163 ("Kroto, et al.") in view of an article by Curl, et al., in Scientific American, 1991, 54 ("Curl, et al."). Further, Claims 89-93 and 95-106 are rejected under 35 U.S.C. §102(b) as defining subject matter which is allegedly anticipated by Kratschmer, et al. I in Surface Science, 1985, 156, 814-821 ("Kratschmer, et al. I").

Applicants have amended the claims and are submitting a Terminal Disclaimer, a second Declaration of Dr. Raouf Loutfy ("Loutfy Declaration II"), and a Declaration by Dr. Alexander Moravsky ("Moravsky Declaration"), which, when considered with the comments hereinbelow, are deemed to place the present case in condition for allowance. Favorable action is respectfully requested.

At the outset, before addressing the merits, Applicants wish to bring to the attention of the United States Patent and Trademark Office that it has mistakenly alleged that this is a RCE; however, this is in error since the previous paper was a submission under 37 C.F.R. §1.129(a) and not under 37 C.F.R. §1.114.

The provisions of 37 C.F.R. §1.129(a) are applicable to applications in which no Appeal Brief has been filed and in which the applications were filed on or before June 8, 1995 having an effective filing date of June 8, 1993 or earlier, accompanied by the appropriate fee under 37 C.F.R. §1.17(r) a submission of a Response fully responsive to a Final Action. The present application is a candidate for this particular provision. More specifically, the present application was filed before June 8, 1995, and claims benefit of an earlier application. The present application is a continuation of USSN 580,246, which was filed on September 10, 1990 and a CIP of USSN 575,254 filed on August 30, 1990. Thus, the effective filing date of the present application is prior to June 8, 1993.

Further this application was never on Appeal, thus, there was never a submission of an Appeal Brief with respect to this application. Moreover, Applicants submitted the appropriate fee under 37 C.F.R. §1.17(r) at the time of the submission of the filing under 37 C.F.R. §1.129(a) and responded to the previous outstanding Final Office Action at the time of this submission accordingly, Applicants complied with the requirements of 37 C.F.R. §1.129(a), and thus the United States Patent and Trademark Office should have accorded the filing on January 6, 2003 as an filing under 37 C.F.R. §1.129(a). In fact, to emphasize that the submission on January 6, 2003 was a filing under 37 C.F.R. §1.129(a), the papers accompanying the submission were entitled "Amendment After Final Rejection under 37 C.F.R. §1.129(a)", thus, indicating that the filing was intended to be in accordance with the provisions of 37 C.F.R. §1.129(a). Moreover, the transmittal letter, accompanying the filing indicated that the submission on January 6, 2003 was a submission under 37 C.F.R. §1.129(a).

Applicants have complied with the rules and even identified this as a filing under 37 C.F.R. §1.129(a). Thus, the United States Patent and Trademark Office should have accorded

the filing as a submission under 37 C.F.R. §1.129(a) rather than as a RCE. Thus, applicants respectfully request that the United States Patent and Trademark Office correct its records and accord the submission on June 6, 2003 as a submission under 37 C.F.R. §1.129(a).

With respect to the Amendment to the claims, Applicants have amended Claims 97 and 98 and claims dependent thereover to recite that the product isolated is visible. Support can be found throughout the specification. For example, the specification exemplifies the isolation of fullerenes in amounts that are visible to the eye, in accordance with the teachings of the present specification. For instance, on Page 11, the specification indicates that a sample was provided having a thickness of an approximately 2 micrometer of C_{60} on a silicon substrate. A coating of 2 micrometers thick is something that can be seen with the naked eye. Moreover, the specification indicates that a powder was formed which was brownish red. Obviously, a powder, which has a definitive color, is also something that can be seen with the naked eye. For additional support, see the discussion of "macroscopic" hereinbelow. Moreover, Claim 107 has been added directed to macroscopic amounts of fullerene. This subject matter is also supported in the specification. For support, see the discussion of "macroscopic" hereinbelow.

No new matter has been added to the application.

Pursuant to the provisional rejection of Claims 89-93, and 95-106 under the judicially created doctrine of obviousness type double patenting, the Office Action alleges that these claims are not patentable over Claims 45-77 and 79-180 of copending application no. 07/580,246.

Since the claims in neither application has been patented, it is premature to reject the claims on this ground at this time, especially since these may not be the final version of the claims. When one of the applications matures into a patent, then it would be more appropriate to raise the issue.

Nevertheless, in order to advance the prosecution hereof, Applicants are submitting a Terminal Disclaimer. The submission of the Terminal Disclaimer overcomes the judicially created double patenting rejection.

Pursuant to the rejection of Claims 89 and 93 under 35 U.S.C. §112, first paragraph, the Office Action alleges that there is no descriptive support for the term "macroscopic" in Claims 89 and 95.

Applicants disagree.

There is adequate written support for the term macroscopic, contrary to the allegations of the Office Action.

The written description requirement of 35 U.S.C. §112, first paragraph, provides that:

> [t]he specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise and exact terms so as to enable any person skilled in the art to which it pertains or with which it is most nearly connected to make and use the same... (emphasis added).

The written description requirement, which is distinct from the enablement and best mode requirements, serves to ensure that applicants have possession of the invention at the time of the filing of the application. In re Wertheim, 541 F.2d 257, 262, 191 USPQ 90, 96 (CCPA 1976). In order to meet the written description requirement, the applicant does not have to use any particular form of disclosure to describe the subject matter, but the "description must clearly allow persons of ordinary skill in the art to recognize that [he or she] invented what is claimed." In re Gosteli, 872 F.2d 1008, 1012, 10 USPQ2d 1614, 1618 (Fed. Cir. 1989). In other words, the applicants must convey with reasonable clarity to the skilled artisan that as of the filing date he or she was in possession of the invention. Vas Cath., Inc. v. Mahurkar, 935 F.2d 1555, 1563-64,

19 USPQ 2d 1111, 1117 (Fed. Cir. 1991). Literal support is thus not necessary for compliance with the description requirement. Id.

There is adequate support in the application for the term "macroscopic". More specifically, support for this term and concept permeate the specification. For example, attention is directed to Example 1 of the instant specification wherein it is specified that the C_{60}-fullerene, a representative example of fullerenes, is obtained as a powder and wherein the color of the product produced therefrom is indicated. Obviously, the isolation of a product as a powder taken together with the fact that it is a colored powder connotes that the product could be seen with the naked eye, consistent with the use of the term macroscopic amounts, as recited in the claims. Furthermore, attention is directed to Page 7, Lines 10-25 of the specification, where it describes that when the sooty product was placed into a non-polar solvent, e.g., benzene, the benzene became colored, and the product produced after extraction with the non-polar solvent is colored. Obviously, one cannot determine these characteristics unless it is present in amounts that can be seen with the naked eye, i.e., macroscopic amounts. For example, if less than macroscopic amounts were produced, no color would be seen. See, Curl, et al., Scientific American 1991, 54-55. In addition, attention is directed to Page 11, Line 30 of the instant specification wherein it is indicated that the IR is taken of an approximately two micrometer thick C_{60} coating on a silicon substrate. Especially since the product is colored, it is obvious that this coating had to be seen with the naked eye. Furthermore, the application makes additional references to characteristics of the product that can only be discernible if the material is present in macroscopic amounts. For example, the application describes that the product produced by sublimation of the carbon soot can range from a uniform film to a coating, and the color is brown to gray depending on the thickness of the coat formed, while the product obtained from extraction is a dark brown to black crystalline material. Obviously, these characteristics, especially color, can be differentiated if the

product was produced in amounts that can be seen with the human eye. In addition, on Page 2, Line 13, the application states that before the prior invention, no one had made C_{60} or C_{70} in appreciable amounts. The implication is that the present inventors were successful in achieving this goal, consistent with the teachings in the application. Appreciable by definition means "enough to be perceived", See Webster Unabridged Dictionary 2nd Ed. p. 91 (1983), which was submitted earlier and is part of the record. Thus, "appreciable" connotes large quantity, and is consistent with the term "macroscopic". All of these descriptions taken together as a whole connote to one of ordinary skill in the art that the inventors had at the time of the filing of the application possession of fullerenes being produced in macroscopic amounts.

Attention is further directed to Kroto I and II Declarations already of record. In Paragraph 14 and 15 of the Kroto I Declaration, Kroto testifies that the application adequately describes the method for making macroscopic amount of fullerenes, such as C_{60} and C_{70}, and that based upon the teachings in the application, it is his opinion that the inventors had in their possession at the time of the filing of the application macroscopic amounts of same. In addition, in the Kroto Declaration II which was executed on July 27, 1995, Kroto testifies that the description in Example 1, including the product as brownish-red powder connotes that the product could be seen with the naked eye. (See Paragraph 15). Moreover, he further testifies that by following the process described in the underlying application, he inherently produces C_{60} in amounts that could be seen with the naked eye. For example, as testified by Dr. Kroto, in Paragraph 18, utilizing the procedure of the underlying application, he had produced 1-5 grams quantities of soot. He further testifies that one kilogram of sooty carbon product produces 100 g of C_{60}, 10 g of C_{70} and 1 gram of other fullerenes. He further testifies that the fullerenes so produced are easily visible to the naked eye. Thus, testimony by Dr. Kroto clearly establishes

that the application clearly conveys to one of ordinary skill in the art that the inventors had produced fullerenes in macroscopic amounts.

Attention in this regard is also directed to the Supplemental Declaration of Harold W. Kroto under 37 C.F.R. §1.132 which was executed on November 16, 1999 ("Kroto III Declaration") and which accompanies this submission.

Although this Declaration was originally submitted in USSN 08/236,933, this application is identical to the present application, except for the claims, and thus the testimony therein is relevant. Dr. Kroto testifies that the specification provides evidence in several instances that the inventors had produced fullerenes in macroscopic amounts. For example, he refers to Example 1, which "describes the product thereof in powder form as brownish-red. Such language connotes, in my opinion, that the product thereof could be seen with the naked eye..."

Moreover, further attention is directed to Paragraphs 15 and 17-19 which are produced in part hereinbelow.

In Paragraph 15 of Kroto Declaration III, Kroto further testifies as follows:

> Moreover, based upon repetition of the process described therein, as described hereinbelow, the process as described in the above-identified application, especially in Example 1, inherently produces fullerenes, e.g., C_{60}, in amounts that could be seen with the naked eye.

Dr. Kroto further testifies in Paragraphs 17, 18 and 19 of the Declaration as follows:

> 17. Utilizing the procedure exactly as described in the above-identified application, I have had fullerenes, including C_{60}, prepared in macroscopic amounts on numerous occasions since 1990 to the present. More specifically, by following the procedure described in the above-identified application and vaporizing

graphite rods in an atmosphere of helium, forming the carbon soot therefrom, collecting the soot and dissolving the soot in benzene, in accordance with the procedure described in the above-identified application, I and my colleagues have prepared and identified various fullerenes, including, inter alia, C_{60}, C_{70}, C_{76}, C_{78}, C_{84} and C_{86}.

18. Moreover, by following the procedure described in the above-identified application, and in accordance with the procedure outlined in Paragraph 17 herein, we have isolated fullerenes in macroscopic amounts, as defined herein. For example, utilizing the procedure outlined in Paragraph 17, I have found that the smoky carbon product contains 5 to 10% C_{60} and 1% C_{70}. We routinely produce the soot in 1-5 gram quantities and routinely extract 100-500 milligram amounts batchwise. Thus, one kilogram of sooty carbon product produces, on average, 100g of C_{60}, 10g of C_{70} and 1 gram of other fullerenes, such as those indicated hereinabove. The various fullerenes formed can and are isolated in accordance with the isolation and purification procedures described in the above-identified application, without an undue amount of experimentation. Furthermore, the various fullerenes are isolated as solids, which are easily visible to the naked eye. For example, in a typical experiment conducted according to the procedure described in the above-identified application, C_{60} is formed in about 100 mg quantities, C_{70} in about 10 mg quantities and the remainder in about 1 mg quantities.

19. Thus, by following the procedure described in the above-identified application, I have found that the process described therein inherently produces … C_{60} in macroscopic amounts. In fact, by following the procedure of Kratschmer and Huffman, outlined in the above identified application, crystalline material of fullerenes, including C_{60}, is produced which can be seen with the naked eye.

Thus, Dr. Kroto testimony clearly evidences that he read the application and that the application clearly conveys to one of ordinary skill in the art that the inventors had produced C_{60} in macroscopic amounts.

Moreover, Dr. Kroto testifies that by following the procedure in the teachings in the above-identified application, one of ordinary skill in the art produces, inter alia, macroscopic amounts of fullerenes. In other words, Dr. Kroto testifies that fullerenes are inherently produced in macroscopic amounts if one of ordinary skill in the art follows the teachings in the above-identified application for producing same.

Case law has held that words describing a function or property that was inherent in the specification is considered to be supported by the disclosure and supports the adequate written description requirement, in accordance with 35 U.S.C. §112, first paragraph. See, In re Reynolds, 443 F.2d 384, 170 USPQ 94 (CCPA 1971). In Reynolds, the question was whether words describing a function that was inherent in the claimed product could be added to the specification by amendment, or whether such description was "new matter". The court cited with approval the holding in Technicon Instruments Corp. v. Coleman Instruments, Inc., 255 F.Supp. 630, 640-641, 150 USPQ 227, 236 (N.D. Ill. 1966), aff'd, 385 F.2d 391, 155 USPQ 369 (7th Cir. 1967), which held that: "By disclosing in a patent application a device that inherently performs a function, operates according to a theory, or has an advantage, a patent applicant necessarily discloses that function, theory, or advantage even though he says nothing concerning it." In re Reynolds, 433 F.2d at 389, 170 USPQ at 98. It was concluded that the express description of the inherent property, since not "new matter", could be added to the specification with effect as of the original filing date. Id.

As testified by Dr. Kroto, by following the teachings in the underlying application, one inherently prepares macroscopic amounts of fullerenes. Consequently, in accordance with the holding in In re Reynolds, this is ample description support for the term "macroscopic amounts", as recited in the claims.

Moreover, attention is directed to the Loutfy I Declaration, previously presented. Although Dr. Loutfy testifies on U.S.S.N. 07/580,246, the application is identical to the underlying application except for the claims. Thus, his testimony is relevant.

Dr. Loutfy testifies that the underlying application describes a process for making fullerenes, e.g., C_{60} and C_{70} in measurable amounts visible to the naked eye, (See Paragraph 11), i.e., macroscopic amounts. Further attention is directed to Paragraph 17 of the Loutfy Declaration which states

> 17. I repeated exactly the Huffman et al. process according to the teaching described in the subject application including example 1 using ¼ inch in diameter graphite rod, at 100 torr Helium, using 100 ampere dc current. This graphite vaporized, and the vapor was condensed on a water cooled surface. The vaporization was performed for 50 minutes using about 17 cm length of the graphite rod and produced 12 gram of soot. The fullerenes were recovered using toluene (sic) and the amount of fullerene was determined. The yield of fullerene was about 8 to 10%. Accordingly, the total recoverable fullerenes was over 1.2 grams with over 900 mg of C_{60} and over 200 mg of C_{70} and the remaining other fullerenes.
>
> According to the teaching in the subject application where they vaporized a ¼" graphite rod with 1 cm length, the inventors (sic) must have produced at least about 600 mg of soot that contains admixture of at least 63 mg of fullerenes that contain at least about 50 mg of C_{60} and at least about 10 mg of C_{70}. A 600-mg quantity of soot certainly can be seen by the naked eye, as also indicated by the inventors (sic) that "heavy block coating on collecting substrates and/or on the walls of the chamber which can be easily scraped off for the recovery step." Also, the 60 mg of fullerene certainly can be seen by the naked eye and it is measurable. Furthermore, the 45 and 10 mg of C_{60} and C_{70} respectively are also measurable, in today's (sic) modern laboratory

facility amount as low as 0.1 mg can be measured, and can be seen by the naked eye.

The same conclusion can be reached by simply calculating the mass of the rod vaporized in Kratschmer et al. I subject application, including example 1, which is easily determined from the diameter of the graphite rod they used (1/4"), the length (1 cm), and typical density of the type of graphite used for graphite vaporization (2.0 g/cc). This calculation estimates that about 633 mg of soot containing fullerenes was produced by Kratschmer et al. I, which is certainly macroscopic and in agreement with the above-presented experimental data.

Moreover, if a longer graphite rod were used, the amount of C_{60}, C_{70} and other fullerenes produced would even be greater, as shown herein above.

As testified, by Dr. Loutfy, by following the procedure of the application, fullerenes were made in amounts that were visible. He testifies that when using the same process as described in Example 1 using the same diameter graphite rod but a longer rod, and performing the vaporization for over 50 minutes, he produced 1.2 g of fullerene including 900 mg of C_{60} and 200 mg of C_{70}. Moreover, he testifies that when the experiments in Example 1 of the underlying application are repeated using the same length rod as in the application, he calculates that at least 63 mg of fullerenes containing at least 50 mg C_{60} and at least 10 mg of C_{70} were produced, i.e., amounts that would be seen with the naked eye, would be produced.

The Loutfy I Declaration comments on why the process in the underlying application produced fullerenes in macroscopic amounts. He testifies that the process described in the underlined application produced a high density of vapor of carbon, as described on Page 4 of the subject application resulting in formation of macroscopic amounts of fullerene.

Thus, the testimony of Drs. Kroto and Loutfy, along with the description in the application clearly provide adequate evidence that at the time of filing of the underlying application, the inventors had possession of macroscopic amounts of fullerenes.

The Office Action states "papers which are already of record…have been addressed either in previous actions or by the Board of Appeals."

However, it is to be noted that Kroto, et al. III Declaration was first made of record in the submission under 37 C.F.R. §1.129(a). Thus, this Declaration was never of record in the Board Action of USSN 07/580,246, which was the application before the Board in the interference upon which it opened. Further, the appellants in the interference before the Board never had an opportunity to brief the issue of descriptive support in that proceeding, with respect to the term "macroscopic"; the Board in the proceeding indicated that the use of the term "macroscopic" in the claims is consistent with the dictionary definition. Moreover, contrary to the position of the Examiner, the Board did not hold that the application did not support the term "macroscopic". All the Board indicated that the term was not defined in the application, but this does not mean that the specification does not support the term "macroscopic". As indicated hereinabove, the term "macroscopic" amounts, as relates to fullerenes, is supported.

The Office Action also comments on the Loutfy Declaration, alleging that the evidence in Paragraph 19 of the Loutfy Declaration of July 16, 2002 is not persuasive "since the source is the same as the Applicant, so it is biased". It is to be noted that the Office Action has not commented on Paragraph 1-18 of the Loutfy Declaration so it is assumed that it is considered persuasive evidence on the issues on which Dr. Loutfy testified.

Moreover, Applicants respectfully submit that the persuasiveness of the conclusions set forth in Paragraph 19 should not be based solely on the fact that the source is the same as the

Applicants. It is to be remembered that the Declaration is accompanied by a statement in the final paragraph that all statements made therein of the knowledge of the declarant are true and that all statements made on information and belief are believed to be true and further that any false statements are punishable and may jeopardize the validity of the application or patent issuing thereon. In other words, there are penalties imposed, which includes possible fines and imprisonment to the declarant if he makes knowingly false statements. Moreover, the validity of any patent issued therefrom may be in question if false statements are made in the Declaration. There are serious consequences. Since Dr. Loutfy has an interest in the patent, he would not knowingly take any action that will jeopardize the enforceability or validity of the patent. Furthermore, in view of the severity of the penalties imposed, he would not take any action which could subject him to fine or imprisonment. If nothing else, because of the penalties associated with false statements, he will not say something unless he truly believes it to be true and accurate. In addition, Dr. Loutfy has a reputation as a scientist and thus will not take any action to cause him to be discredited. Thus, considering these factors, the statements by Dr. Loutfy in his Declaration should be taken with as much weight as and even more weight than if these statements were made by a third party.

Moreover, the United States Patent and Trademark Office should not dismiss the evidence in the Declaration of Dr. Loutfy based solely on the source, but should consider the merits of the evidence presented, which it appears not to have done, which is contrary to the holding of In re Alton, supra.

Furthermore, it is well recognized in the scientific community that the process of the underlying application produces fullerenes in macroscopic amounts. See Curl, et al. Scientific American, October 1991, pg. 54-62, and especially pg. 54 and 55, wherein Smalley, et al., admit

that Huffman and Kratschmer, using their techniques which is that which is described in the underlying application, were the first to make amounts of fullerenes in amounts sufficient enough to see, touch or smell. Moreover, attention is directed to U.S. Patent No. 6,077,401 attached as Exhibit 2 to Loutfy I Declaration, previously submitted, wherein it is acknowledged that the present inventors were the first to isolate macroscopic amounts of "C_{60}", i.e., a fullerene. Further, attention is directed to the press release of the Royal Swedish Academy of Sciences, copy previously submitted, awarding the Nobel Prize to Smalley, et al. in which it identified Kratschmer and Huffman as the first to produce isolable quantities of C_{60}, a fullerene. See also the videotape entitled "Molecules With Sunglasses," copy previously submitted, wherein Smalley and others testify that Kratschmer and Huffman were the first to produce fullerenes in macroscopic amounts. In addition, See also, MRS Bulletin, 1994, 54 et seq., (previously submitted) wherein Huffman and Kratschmer, the inventors of the above-identified application, are recognized by MRS and received an award from MRS "for the discovery of a way to produce macroscopic amounts of fullerenes..." See also Europhy New 25, 1994 and the Certificate Attached, awarding Smalley, Krotto, Huffman and Kratschmer for the Discovery of New Molecular Forms of Carbon and Their Production in the Solid States, (previously submitted). As stated therein, Kratschmer and Huffman "found" that they could produce crystals of C_{60} and C_{70} and dissolve C_{60} and C_{70} in the soot produced by a carbon arc and cooled by helium.

All of this evidences that the present process produces macroscopic amounts of fullerenes and that the application conveys to the skilled artisan that the inventors had possession of making the products of the present invention, i.e., fullerenes, in macroscopic amounts.

Case law has held that the description requirement is met if the application conveys to the skilled artisan that the applicants has possession of the invention at the time of the filing. Vas

Cath Inc. v. Mahurkar, 935 F.2d 1535, 19 USPQ2d 1111 (Fed. Cir. 1995). The testimonies by Kroto in all three Declarations and Loutfy, who are skilled artisans in the field, evidence that they understood, from reading the application, that the applicants had made macroscopic amounts of fullerenes and had it in their possession at the time of the filing of the application, providing further evidence that there is adequate support in the specification for the term "macroscopic".

The present situation is not unlike that in In re Smythe, 480 F.2d 1376, 178 USPQ 279 (CCPA 1973). In Smythe, the invention related to a "continuous automatic analysis system where discrete liquid samples...are successfully introduced into an apparatus as a continuous stream, the individual samples being separated by a segmentizing medium." Both the specification and original claims identified this medium as "air or other gas which is inert to the liquid." The applicant later added claims that described the medium as "inert fluid". The United states Patent and Trademark Office rejected the added claims on the basis of the description requirement, but the Smythe Court reversed, stating that the use of the term "inert fluid" would naturally occur to the skilled artisan reading the description of the use of air or other gas as a segmenting medium to separate the liquid samples. Id at 1384, 178 USPQ at 285. The court provided its rationale as follows:

> ....[W]hereas the broader concept of using "inert fluid" would naturally occur to one skilled in the art from reading appellants' description of the use and functions of the segmenting medium specifically described, we see no basis for denying appellants the claims which recite the segmenting medium broadly as "an inert fluid". The alternative places upon patent applicants, the Patent Office, and the public the undue burden of listing, in the case of applicants, reading and examining, in the case of the Patent Office, and printing and storing, in the case of the public, descriptions of the very many structural or functional equivalents of disclosed elements or steps which are already stored in the minds of those

skilled in the arts, ready for instant recall upon reading the descriptions of specific elements of steps.

We are not saying that the disclosure of 'air or other gas which is inert to the liquid' sample by itself is a description of the use of all 'inert fluid' media. Rather, it is the description of the properties and functions of the 'air or other gas' segmentizing medium described in appellants' specification which would suggest to a person skilled in the art that appellants' invention includes the use of 'inert fluid' broadly...

A hypothetical situation may make our point clear. If the original specification of a patent application on the scales of justice disclosed only a 1-pound 'lead weight' as a counterbalance to determine the weight of a pound of flesh, we do not believe the applicant should be prevented, by the so-called 'description requirement' of the first paragraph of §112, or the prohibition against new matter of §132, from later claiming the counterbalance as a 'metal weight' or simply as a 1-pound 'weight', although both 'metal weight' and 'weight' would indeed be progressively broader than 'lead weight', including even such an undisclosed, but obviously art-recognized equivalent, 'weight' as a pound of feathers. The broader claim language would be permitted because the description of the use and function of the lead weight as a scale counterbalance in the whole disclosure would immediately convey to any person skilled in the scale art the knowledge that the applicant invented a scale with a 1-pound counterbalance weight, regardless of its composition. (Emphasis in original)

The Smythe Court held that the description in the application suggested to the skilled artisan the broader term. Similarly, as in Smythe, the present application supports the concept "macroscopic amounts of fullerenes". Based upon all of the evidence referred to hereinabove, when reading the application, it is clear that a skilled artisan would understand that Applicants had possession of macroscopic amounts, as relating to fullerenes as testified by both Dr. Kroto and Dr. Loutfy in their Declarations.

According to the Office Action, the literal language of the original disclosure supports the production of fullerene in quantities sufficient to produce coatings that are 2 microns thick. Although the specification supports the production of fullerenes in macroscopic amounts, even if the allegation in the Office Action were correct, this is an admission by the United States Patent

and Trademark Office that significant amounts of fullerene were prepared. These "significant amounts" are amounts that are visible to the naked eye, and thus support the term "macroscopic".

The Office Action cites In re Barker, 194 USPQ 470 (CCPA 1977); according to the Office Action, Barker contained drawings that showed contemplation of an embodiment of making prefabricated panels of wooden shingles, where the backing board had lengths of four or eight feet with a repetitive series of eight or 16 shingles per backing board. The applicants wished to amend the claims to recite a backing board having a length at least as great as the aggregate width of at least six shingles, but the Barker court held that the specification did not support such an amendment. However, the present situation is quite distinct from that of In re Barker. In Barker, there was nothing in the specification which applicants could point to which connoted the language that they wish to add to the claims. It was clear that applicants contemplated backing boards of four and eight foot lengths having a repetitive series of eight or 16 shingles thereon; and that there was no support for language that applicants wished to add. This is unlike the present situation in which there are plenty of passages, which taken as a whole connote and support that applicants had possession of macroscopic amounts of fullerenes at the time of filing, and these passages were indicated hereinabove. In addition, unlike the situation in Barker, applicants have submitted Declarations from skilled artisans who attest to the fact that the application supports and describes "macroscopic amounts" of fullerenes.

Therefore, for the reasons provided, there is adequate support, in compliance with the requirements of 35 U.S.C. §112, first paragraph, for the term "macroscopic". Thus, the rejection of Claims 89 and 93 under 35 U.S.C. §112, first paragraph is overcome; withdrawal thereof is respectfully requested.

Pursuant to the rejection of Claims 89-92 and 95-106 under 35 U.S.C. §102(b), or in the alternative under 35 U.S.C. §103 the Office Action cites Kroto, et al. with Curl, et al. cited to show a state of fact.

Claim 89 recite that macroscopic amount of fullerene are produced. Claims 90 and 91 recites that the fullerene is a visible product, while Claim 92 recites that the fullerene is a visible solid. As one skilled in the art is well aware, if the fullerene produced is visible, then it can be seen with the naked eye. As defined in Webster's Dictionary, visible implies that is capable of being seen to the naked eye. Claims 95 and 96 are dependent upon the aforementioned claims and thus the above comments are incorporated by reference. Claim 97 recites that the cage carbon alleotrope, i.e., fullerene, is visible. Claims 98 and 99 and claims dependent thereon (Claims 100-103) are directed to fullerenes as visible solid. It is to be noted that the process that is described in Claims 98 and 99 is the formation of a product that is predominately a fullerene and not a product comprised of fullerene. Thus, Claim 98 and 99 and claims dependent thereon are directed to fullerene products comprised substantially of fullerenes visible to the eye. Claims 104-107 are directed to visible or macroscopic amounts of fullerenes.

Thus, in all cases, the fullerenes is produced in amounts that would be seen, i.e., macroscopic amounts.

Kroto, et al. is directed to a method of making C_{60}, C_{70} in which graphite was vaporized by laser irradiation and detected by time of flight mass spectroscopy. As stated in Curl, et al. at page 54, Kroto, et al. could not collect more than a few tens of thousands of molecules. As stated:

> "This amount was plenty to detect and probe with the sophisticated techniques available in our

> laboratory, but there was not enough to see, touch or smell."

Thus, it is admitted that by the techniques described in Kroto, only a few thousands of molecules were made, but it was not sufficient to see as a visible product. However, as claimed herein, the fullerenes are visible. Moreover, since it could not be seen, fullerenes could not be isolated as a solid product. However, as claimed herein the fullerenes are isolated as a solid. Thus, contrary to the claims of the present application the fullerenes produced by Kroto were not made in macroscopic amounts as claimed by the present application.

However, the claims are directed to macroscopic amounts of fullerene, in one form or another. The claims recite that the fullerenes are visible, a characteristic of macroscopic amounts. See definition of "macroscopic" in Webster's Dictionary. In addition, the claims recite that the product is produced in sufficient amounts to be isolated as a visible solid. Again, this amount can only be achieved if the product were visible. Kroto, et al. do not teach, disclose or suggest fullerenes in these amounts. This fact is admitted by authors of these article in Scientific American, 1991 pp 54-63. Attention is directed to pg. 54-55, in which they admit that they never produced visible or macroscopic amounts of fullerenes.

Since the Kroto, et al. reference does not teach all of the elements of the claims, e.g., "visible product" and/or "solid" and/or macroscopic amounts, Kroto, et al. do not teach or disclose the claimed invention and thus cannot anticipate the claims of the present application. Thus, for the reasons given herein, the rejection of Claims 88, 90-91 and 94-103 under 35 U.S.C. §102(b) is obviated; withdrawal thereof is respectfully requested.

Moreover, as shown by the teachings in Kroto, et al. and commented by Curl, et al. the process of Kroto, et al. only produced molecules of C_{60} and/or C_{70} in quantities insufficient to see those products with the naked eye. Moreover, as further indicated by Curl, et al. no matter how

much they tried they would not isolate visible amounts of fullerenes, i.e., they would not produce fullerenes in amounts sufficient to be seen by the naked eye. Thus, Kroto, et al. do not teach disclose or suggest fullerenes in amounts that are visible. They do not teach, disclose or suggest fullerenes in quantities sufficient to be obtained in a visible solid. Kroto, et al. do not teach disclose or suggest fullerenes in macroscopic amounts.

Moreover, applicants respectfully submit that the Kroto, et al. article is non-enabling to make fullerenes, e.g., C_{60} or C_{70} in macroscopic amounts or language equivalent thereto, e.g., visible solid form, as a solid, in macroscopic amounts or in equivalent language. They never prepared solid or crystalline C_{60} or C_{70}, as presently claimed. It was not possible to prepare the visible solid or, for that matter, C_{60} or C_{70}, in any appreciable amounts, without undue experimentation. As stated in Curl, et al., despite extensive efforts by the scientific community, no one was successful in preparing C_{60} or C_{70} in any appreciable amounts before the present invention. Consequently, Kroto, et al. do not teach, disclose, or even suggest solid fullerene in visible amounts macroscopic amounts of fullerenes, or visible amounts, of fullerenes, as presently claimed. In fact, Kroto, et al. are not enabling for producing any fullerenes in these quantities.

To be enabling, a reference must describe an invention sufficiently to have placed the public in possession of it. In re Donahue, 766 F.2d 531, 226, USPQ 619 (Fed. Cir. 1985).

The test of enablement is whether one reasonably skilled in the art could make or use the invention from the disclosure in the reference coupled with the information known to one skilled in the art without undue experimentation. United States v. Teletronics, Inc., 857 F.2d 778, 775 8 USPQ 21 1217 (Fed. Cir. 1988), cert. denied 109 S.Ct. 1954 (1989).

But, the public was not possessed of a method of preparing, isolating, and C_{60} and C_{70}, in the amounts claimed in the present application, including a C_{60} or C_{70} in the solid state. Based on the teachings by Kroto, et al., people skilled in the art were unsuccessful in preparing macroscopic quantities of C_{60} or C_{70}. Despite extensive efforts, no solid fullerenes or C_{60} or C_{70} could be made or isolated until these were prepared and isolated by the present inventors. Furthermore, despite the extensive efforts, no visible amounts of fullerenes was ever prepared and isolated until the advent of the present inventors. Thus, Kroto, et al. did not place the public in possession of the applicants' invention.

> It is well settled that prior art under 35 U.S.C. §102(b) most sufficiently describe the clamed invention to have placed the public in possession of it .... Such possession is effected if one of ordinary skill in the art could have combined the publication's description of the invention with his own knowledge to make the claimed invention. Accordingly, even if the claimed invention is disclosed in a printed publication, the disclosure will not suffice as prior art if it was not enabling... In re Donahue, 766 F.2d 531, 533, 226 USPQ 619, 621 (Fed. Cir. 1985).

Moreover, the Court continues that if the reference teaches that attempts to make the invention failed, as in the present case, the reference is non-enabling:

> ...In those cases, the references wee deemed insufficient because they stated that attempts to prepare the claimed compounds were unsuccessful. Such failures by those skilled in the art (having possession of the information disclosed by the publication) are strong evidence that he disclosure of the publication was non-enabling. Id.

Furthermore, Kroto, et al. were completely unsuccessful in making, isolating and collecting C_{60} and C_{70} in any appreciable amounts. They only had indirect evidence of what it is that they made. They never made fullerene as a visible solid. They admitted that they never

made or isolated visible amounts of fullerenes. Thus, they never made macroscopic amounts of fullerenes. Whatever they made, they only made it in non-measurable amounts. At best, they could only make molecules of something, only tens of thousands of molecules, which they could not touch, see or smell. No matter how much they tried, they were always unsuccessful in making more. They could never make enough material to put it in the possession of the public:

> Thus, for five years, we had been searching for a method of producing visible amounts of the stuff. We called our efforts "the search for the vial" because quantum calculations for such a soccer ball shaped carbon molecule suggested it would absorb light strongly only in the far violet of the spectrum....

Curl, et al. at 55.

Contrary to the allegations the Office Action, Kroto, et al. do not make the amounts of fullerenes, e.g., in the amounts recited in the rejected claims or place the public in possession thereof. Thus, Kroto, et al. is non-enabling for making the amounts claimed in the present process and cannot be used for that purpose.

Moreover, the Kroto, et al. process was different from the process of the present invention for still another reason. Attention is directed to Loutfy I Declaration in which Dr. Loutfy distinguishes the process of the present invention form that of the prior art. See paragraph 15 of the Loutfy I Declaration. More specifically, unlike the prior art, including the process of Kroto, et al., the present process produces a high density of the vapor of carbon, as described on Page 4 of the subject application resulting in the formation of macroscopic amounts of fullerenes by the present method. Id. The Kroto, et al. process could not produce or suggest how to produce a high density of vapor of carbon by their process.

Thus, the process described in Kroto, et al. could not make fullerenes as a solid, in amounts that are visible as a solid and do not teach, disclose or suggest how to do so. Kroto, et

al. only teach and suggest, at best, molecules of C_{60} or C_{70}, not enough to see. Kroto, et al. do not teach or disclose how to make fullerenes in macroscopic amounts. Finally, as indicated hereinabove one of ordinary skill in the art at the time of the filing of the applications could not make fullerenes in these amounts.

Thus, Kroto, et al. do not teach, disclose or suggest the subject matter of the rejected claims.

Therefore, the rejection of Claims 89-92 and 95-100 under 35 U.S.C. §102(b) or in the alternative under 35 U.S.C. §103(a) is obviated; withdrawal thereof is respectfully requested.

Pursuant to the rejection of Claims 89-93, and 95-106, the Office Action cites Kratschmer, et al. I.

Kratschmer, et al. I disclose the process of making carbon clusters. The molecules were produced by diffusive coagulation of carbon vapor trapped in an Ar matrix. The article suggests that carbon clusters as large as C_8 or C_9 may have been formed; it does not teach, disclose or suggest any molecules containing more than nine carbon atoms. More specifically, it does not teach, disclose or suggest a process in which fullerenes are formed. A quick review of Kratschmer, et al. I clearly reveals that there is no mention of fullerenes, or any species of fullerenes therein.

Further, Kratschmer, et al. I do not teach, or disclose that they had in their possession fullerenes. More specifically, they noted that the products which they produced had strong absorption bands originating from matrix-isolated carbons. They identified them as C_4, C_5, C_6, C_7, C_8 and C_9. These carbon clusters are not fullerenes, as claimed by the present invention. Thus, there is no teaching or suggestion in Kratschmer, et al. I that fullerenes were produced. Moreover, whatever it is they made, Kratschmer, et al. I never isolated macroscopic, i.e., visible

amounts of fullerenes, as claimed in the present application. They never isolated fullerenes, as a solid, or as a visible solid, as claimed in the present application.

It is not surprising that the products prepared by Kratschmer, et al. I are different from that of the present invention since the reaction conditions were different. According to the process described in Kratschmer, et al. I, graphite is vaporized in an electric arc operating in 10^{-6} torr maintained in the chamber by a turbomolecular pump. Carbon vapor produced in the interelectrode space flows through a high vacuum chamber to a cryo-cooled surface, wherein it is co-deposited with an argon molecule, thus forming a layer of solid argon with embedded carbon products. This is unlike the conditions described in the present invention, wherein the conditions are such to make fullerenes in macroscopic or visible amounts or amounts sufficient to isolate as a solid. As described on Page 4, lines 1-10, of the instant specification, under the conditions of the present invention, a high density of carbon vapor is produced, however under the conditions in Kratschmer, et al. I, at such low pressure, it was not possible to produce a high density of carbon and thus, they could not produce fullerenes.

The Office Action alleges that fullerenes, are inherently produced since it alleges that the conditions for making fullerenes by the process described in the present application is identical with that disclosed in Kratschmer, et al. I and thus concludes that the process of Kratschmer, et al. I inherently produces species of fullerenes.

However, contrary to the allegations in the Office Action, the conditions therein are not identical to the conditions of the present process, The conditions in Kratschmer, et al. I do not produce fullerenes, e.g., C_{60} or C_{70}. The process therein is not conducted under conditions sufficient to form and recover fullerenes. For example, the pressure therein is too low; under the

conditions of the arc process described therein, at pressures as low as 10^{-6} torr, fullerenes, e.g. C_{60} or C_{70} are not produced.

As evidence thereof attention is directed to the Second Declaration of Dr. Loutfy ("Loutfy II Declaration") containing 14 paragraphs dated July 16, 2002 in which Dr. Loutfy reports on the products produced in accordance with the teachings described in a Kratschmer, et al. I. See Paragraphs 11, 13-14 Loutfy Declaration. As described in Paragraphs 13 and 14, when Dr. Loutfy performed the experiments in accordance with the teachings in Kratschmer, et al., I no fullerenes were detected. Dr. Loutfy concludes that the reason why no fullerenes were produced was because the pressure was too low. See paragraph 14 of Loutfy II Declaration.

This is further corroborated by the Declaration of Alexander P. Morovsky ("Moravsky Declaration") which further supports that fullerenes, e.g., C_{60} or C_{70} were not produced by the process in Kratschmer, et al. I. Attention is directed to Paragraph 9 in which he testifies that he reviewed the spectra in the Kratschmer, et al. I and he finds no evidence therein of any fullerenes, e.g., C_{60} and C_{70} and the like produced therein. ("Morovsky Declaration, paragraph 9). Moreover, Dr. Morovsky testifies that as a theoretical matter the conditions therein cannot form fullerenes. (See paragraphs 12-13 of Morovsky Declaration). When the inert gas pressure is too low, the carbon soot is not cooled sufficiently, so that formation of fullerenes is not possible. (See paragraphs 11-12 of Morovsky Declaration). The process for making fullerenes requires the presence of sufficient inert quenching gas to cool the hot intermediates carbon products. (See paragraphs 11-12 of Morovsky Declaration). Thus, unlike the process described in Kratschmer, et al., I, in the process of the present invention, the fullerenes are produced by vaporizing a carbon source, such as graphite, in the presence of an inert quenching gas under conditions sufficient to produce fullerenes, e.g., C_{60} or C_{70}, in macroscopic amounts.

Thus, as shown by the experiments described in the Loutfy II Declaration and by the theoretical explanation in the Morovsky Declaration, the process of Kratschmer, et al. I does not produce fullerenes e.g., C_{60} or C_{70}, products, which are formed by the present process. Thus, the conditions of Kratschmer, et al. I are not the same as those of the present process. Therefore, Kratschmer, et al. I do not anticipate the present invention. Thus, for the reasons given herein, the rejection of Claims 89-93, and 95-106 under 35 U.S.C. §102(b) is overcome; withdrawal thereof is respectfully requested.

Thus, in view of the Amendment to the claims, the attached Declarations of Kroto III Loutfy II and Morovsky, the Terminal Disclaimer and the remarks herein, it is respectfully submitted that the present case is in condition for allowance, which action is earnestly solicited.

Respectfully submitted,

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